NEW DATA ON THE FORMATION OF $Ca(O_2)_2$

BY MEANS OF $CaO_2 \cdot 2H_2O_2$

I. I. Vol'nov and A. N. Shatunina

NATIONAL AERONATUICS AND SPACE ADMINISTRATION
WASHINGTON, D.C.   20546   NOVEMBER 1974

1. Report No. NASA TT F-15,796	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle NEW DATA ON THE FORMATION OF $Ca(O_2)_2$ BY MEANS OF $CaO_2 \cdot 2H_2O_2$		5. Report Date NOVEMBER, 1974
		6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No.
		10. Work Unit No.
9. Performing Organization Name and Address LINGUISTIC SYSTEMS, INC. 116 AUSTIN STREET CAMBRIDGE, MASSACHUSETTS 02139		11. Contract or Grant No. NASW-2482
		13. Type of Report & Period Covered TRANSLATION
12. Sponsoring Agency Name and Address NATIONAL AERONAUTICS AND SPACE ADMINISTRATION WASHINGTON, D.C. 20546		14. Sponsoring Agency Code

15. Supplementary Notes TRANSLATION OF

16. Abstract

The compound $CaO_2 \cdot 2H_2O_2$ at $40°$ and $6 \cdot 10^{-3}$ mm Hg as a result of the intramolecular redox reaction, forms an equimolecular mixture of hyperoxide and hydroxide of calcium.

17. Key Words (Selected by Author(s))	18. Distribution Statement UNCLASSIFIED - UNLIMITED	
19. Security Classif. (of this report) UNCLASSIFIED	20. Security Classif. (of this page) UNCLASSIFIED	21. No. of Pages
		22. Price

NEW DATA ON THE FORMATION OF $Ca(O_2)_2$ BY MEANS OF $CaO_2 \cdot 2H_2O_2$

I. I. Vol'nov and A. N. Shatunina*

During investigation of the process of transformation of /2032**
$CaO_2 \cdot 2H_2O_2$ into $Ca(O_2)_2$ at a constant pressure of 10 mm Hg by the reaction

$$2CaO_2 \cdot 2H_2O_2 \rightarrow Ca(O_2)_2 + Ca(OH)_2 + 3H_2O + 1.5O_2 \qquad (1)$$
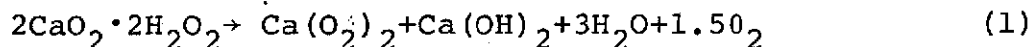
we studied [1-7] the influence of a series of factors--temperature, time and size of the surface--on which the weighed quantity of $CaO_2 \cdot 2H_2O_2$ was distributed. It was established that, at the indicated pressure, the maximum content of $Ca(O_2)_2$ in the final product, about 40% by weight, was achieved at 50°, 100 minutes and with a distribution of the weighed quantity of the initial substance of 1 gram on a surface of approximately 1800 cm^2. These data were later confirmed by Johnson and Miller [8,9].

Taking into account that the process of transformation must proceed more intensely in a vacuum, experiments were conducted at various degrees of vacuum, with a constant temperature in the layer equal to 40°, at a constant time equal to 60 minutes, and with a distribution of the weighed quantity of $CaO_2 \cdot 2H_2O_2$ of 1 gram on a 100 cm^2 surface, it is evident that the maximum content of $Ca(O_2)_2$ in the end product, equal to 55.4% by weight, is attained at a pressure of $6 \cdot 10^{-3}$ mm. The relation of the $Ca(O_2)_2$ content to the size of the surface on which 1 g of $CaO_2 \cdot 2H_2O_2$ is distributed, at a residual pressure of $6 \cdot 10^{-3}$ mm, and with other equal conditions,

---

* N. S. Kurnakov Institute of General and Inorganic Chemistry, Academy of Sciences USSR

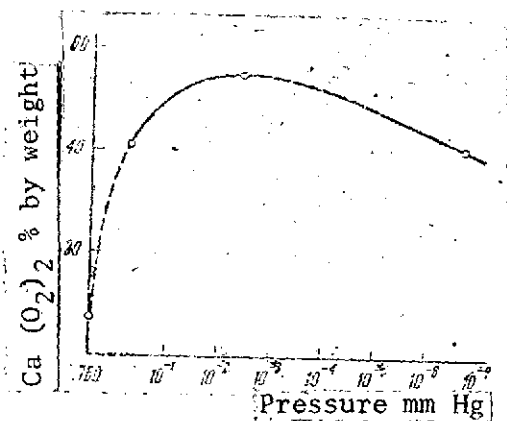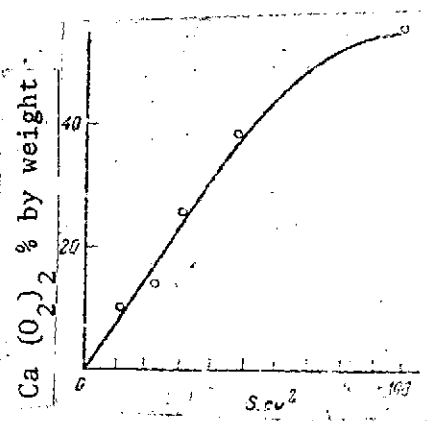** Numbers in the margin indicate pagination in the foreign text.

Fig. 1

Fig. 2

Fig. 1. The dependence of the yield of $Ca(O_2)_2$ on the degree of vacuum.

Fig. 2. The change of content of $Ca(O_2)_2$ (in %) as a function of the surface area on which 1 g of $CaO_2 \cdot 2H_2O_2$ is distributed.

is shown in Fig. 2. The obtained value of 55.4% by weight of $Ca(O_2)_2$ is close to the maximum, because by reaction (1) 1 M (mole) of $Ca(O_2)_2$ and 1 M of $Ca(OH)_2$ are formed which corresponds to 58.4% by weight of $Ca(O_2)_2$.

Conclusions

The compound $CaO_2 \cdot 2H_2O_2$ at 40° and 6.10^{-3} mm Hg as a result of the intramolecular redox reaction, forms an equimolecular mixture of hyperoxide and hydroxide of calcium.

REFERENCES

1. I. I. Vol'nov, V. N. Chamova, V. P. Sergeyeva, and Ye. I. Lat-
   ysheva, Zhurnal neorganicheskoy khimii (ZNK), 1, 1937 (1956).
2. I. I. Vol'nov, V. N. Chamova, and Ye. I. Latyshev,
   ZNK, 2, 263 (1957).
3. I. I. Vol'nov, V. N. Chamova and A. N. Shatunina,
   ZNK, 3, 1095 (1958).
4. I. I. Vol'nov, V. N. Chamova, ZNK,
   3, 1098 (1958).
5. I. I. Vol'nov, V. N. Chamova, and V. P. Sergeyeva,
   ZNK, 4, 253 (1959).
6. I. I. Vol'nov, Ye. I. Latysheva, Zhurnal analiticheskoy khimii,
   14, 242 (1959).
7. I. I. Vol'nov, V. N. Chamova, ZNK,
   5, 522 (1960).
8. R. S. Johnston, R. Miller, Analytic Chemistry, 30, 511, (1958).
9. A. Petrocelli, Aerospace Medicine, 36, 1187 (1965).

Area Cm